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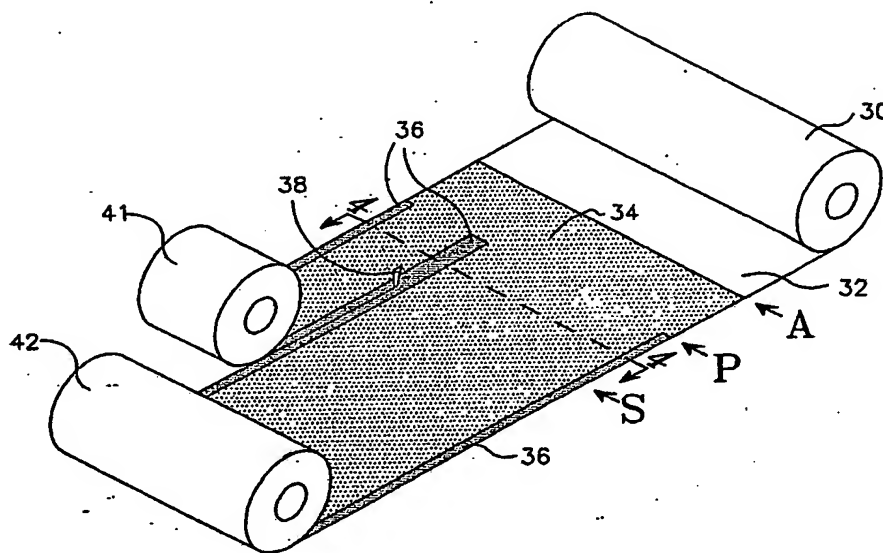
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(54) Title: TOPCOATED ADHESIVE DIAPER TAPE AND METHOD



## (57) Abstract

A pressure-sensitive tape substrate (30) is coated with an adhesive (34), and the adhesive is then printed with an ink or the like (36) that acts as an adhesive-inhibiting masking or barrier along one or more continuous zones or lines. Tapes (41, 42) are formed in whole or in part by slitting along the continuous line or lines so defined. The technique is used to make transfer tapes, diaper fastener tabs, and other products.

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## 1 TOPCOATED ADHESIVE DIAPER TAPE AND METHOD

2 This invention relates to pressure-sensitive adhesive  
3 tapes, adhesive tabs formed therefrom, and methods for  
4 manufacturing the same. In one aspect, the invention relates  
5 to improvements in transfer tapes and like products, and in  
6 the manufacture of the same. In another aspect, the invention  
7 relates to improvements in laminate web constructions of  
8 diaper fastener-tab stock of the kind adapted to be supplied  
9 to a diaper manufacturer and to be separated by the  
10 manufacturer into individual diaper-fastening tabs and applied  
11 to individual diapers, usually two tabs to a diaper for infant  
12 diapers and six tabs to a diaper for adult diapers. In this  
13 aspect, the invention particularly relates to means forming  
14 part of the diaper tabs and providing novel conveniently  
15 manipulated fingerlifts for the tabs.

16 Prior Art

17 It has been previously proposed to make articles from  
18 pressure-sensitive adhesive tapes in which the layer of  
19 pressure-sensitive adhesive is partially covered with a  
20 printed pattern of ink.

21 In U.S. Patent 3,159,930 to Allen et al., a pressure-  
22 sensitive tape has a layer 5 printed on the adhesive face.  
23 This layer combines adhesive masking and indicia functions,  
24 the indicia being in the form of negative images in the mask.  
25 The masking layer masks most of the adhesive at the centers  
26 of the document-containing articles which are to be cut from  
27 the tape, but leaves the adhesive exposed at the edges of the  
28 articles. The tape is combined with a release liner.

29 In U.S. Patent 3,874,893 to Cherrin, which is similar  
30 to Allen et al., one or more layers of ink or "overprint  
31 lacquer" or "a coating which through solvent or other action  
32 causes the adhesive to lose most of its adhesive properties"

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1 are applied to the adhesive side of a tape using a  
2 flexographic press. When two printed layers are used, the  
3 first consists of printed indicia and the second of a  
4 background layer which is patterned to leave the adhesive  
5 exposed at the edges of document-containing articles which are  
6 to be cut from the tape. The background layer functions to  
7 mask the adhesive so as to render it non-adhesive at the  
8 printed areas. In one embodiment, additional spaced patterns  
9 56 (Figs. 12 and 13) are printed on the adhesive to function  
10 as corner lift tabs when the tape is cut into individual  
11 articles. However, the great majority of the cutting of the  
12 tape is done directly through the adhesive at unprinted areas  
13 thereof, thereby leaving unprinted adhesive directly exposed  
14 at the side edges of the tape.

15 In U.S. Patent 4,068,028 to Samonides, indicia are  
16 printed on the adhesive layer of transparent pressure-  
17 sensitive labels. These indicia are visible but "buried" and  
18 protected when the labels are applied to a mounting surface.  
19 In a variant, the labels are opaque, and indicia are printed  
20 both on the adhesive layer and on the face side of the label.  
21 When the label is mounted on the inner side of a glass window  
22 or the like, the indicia on the adhesive side are visible from  
23 the exterior side of the window and the indicia on the face  
24 side are visible from the interior side.

25 In U.S. Patent 4,107,811 to Imsande, a tacky floor mat  
26 consists of a stack of adhesive-coated sheets peelably joined  
27 to each other. To provide lift tabs for the sheets, "a thin  
28 coating of non-adhesive material 18 is print-deposited" (col.  
29 3, line 61) in a pattern on the adhesive-coated web material  
30 from which the sheets are to be cut. The adhesive-coated web  
31 material with the patterned coating 18 thereon is then  
32 laminated to itself to form a multilayer web (presumably with  
33 the pattern of non-adhesive material 18 maintained in  
34 register, layer to layer). The laminated material is then cut  
35 to sheet size in such manner that the patterned non-adhesive  
36 material 18 ends up at the corners of the stacked sheets. The

1 non-adhesive material may be of a different color than the  
2 sheets.

3 In U.S. Patents 4,671,003 and 4,787,158 to Vitol,  
4 removable pressure-sensitive sign stock is backed with release  
5 liner which has been perforated at regular intervals, the  
6 perforations being in the form of round openings where the  
7 adhesive is exposed. Talc or other adhesive masking material  
8 is applied to the adhesive at the areas of these openings, and  
9 the stock is then slit in both directions to form individual  
10 signs of rectangular or other shape each having one or more  
11 starting tabs at one, two or four corners. Circular labels  
12 are also disclosed having wedge-shaped non-adhesive areas, but  
13 how the corresponding perforations in the liner relate to the  
14 circular label shape, and how the circular labels are formed  
15 from the label stock is not apparent.

16 Various fingerlift arrangements specific to diaper tabs  
17 are also known in the prior art. One simple arrangement is  
18 to provide an adhesive-free zone at the fingerlift edge, as  
19 in U.S. Patent 3,833,456 to Reed et al. This fingerlift edge  
20 can be difficult to grasp; there is no clear indication of the  
21 presence of a fingerlift, and the unsupported edges of rolls  
22 from which such tabs are cut can be easily damaged.

23 Another fingerlift arrangement for a diaper tab is a  
24 fold-over arrangement, as in U.S. Patent 3,893,460 to Karami.  
25 If such folding-over is done during manufacture of the diaper  
26 fastener stock, differences in thickness are created across  
27 the width of the stock, causing distortions when the stock is  
28 rolled up for storage and shipment. On the other hand, if the  
29 folding-over is delayed only to be attempted on the diaper  
30 line, the difficulty of performing that step as part of the  
31 fastener dispensing and application procedure on the diaper  
32 line presents a risk of line stops and delays in diaper  
33 production.

34 Another known fingerlift arrangement for a diaper tab  
35 is a strip lamination, as in U.S. Patent 4,726,971 to Pape  
36 et al. The laminated strip extends outwardly of the width

1 of the diaper fastener stock, so that when the same is rolled  
2 and transported, the laminated strip can be easily damaged.  
3 Also, the strip creates local thickness variations in the  
4 roll.

5 Still another arrangement is a pull string, as in U.S.  
6 Patent 4,005,713 to Mesek. This too may cause thickness  
7 variations, and may be complicated to fabricate and  
8 manipulate, particularly at high diaper line speeds.

9 Summary of the invention

10 Like the first six prior-art references listed above,  
11 the present invention also involves the making of articles  
12 from pressure-sensitive adhesive tapes in which the layer of  
13 pressure-sensitive adhesive is partially covered with a  
14 printed pattern of an adhesive barrier or ink. However, in  
15 the present invention as it relates to transfer tapes, the  
16 printing is along a continuous zone or line, and the tape is  
17 formed in whole or in part by slitting along that continuous  
18 line through the tape substrate, an adhesive coating, and the  
19 printed barrier. In the present invention as it relates to  
20 diaper tabs, an adhesive barrier or ink is used to form end  
21 fingerlifts for the tabs.

22 In one aspect, the present invention involves the concept  
23 of utilizing such means to eliminate or minimize  
24 complications, constraints and disadvantages involved in  
25 pattern-coating substrates with pressure-sensitive adhesive  
26 in the manufacture of transfer tapes and other articles. In  
27 particular, the invention minimizes or eliminates  
28 complications, constraints and disadvantages involved in the  
29 need to pattern-coat the adhesive as it is applied in order  
30 to allow slitting at one or more intermediate locations across  
31 the width of the line to define a specific tape width or  
32 widths, and in order to provide adhesive-free and therefore  
33 "pick"-free roll edges.

34 The invention overcomes the present inability to slit

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1 rolls of premanufactured transfer tape stock to various widths  
2 on demand, and eliminates the corresponding need to  
3 manufacture and inventory various widths of transfer tape  
4 pending demand for one or the other specific width or widths.  
5 The invention enables the manufacture of tape stock and tapes  
6 of substantially uniform thickness from one edge to the other,  
7 with attendant advantages to the manufacturer and converter.

8 In another aspect, the invention provides for the  
9 manufacture of diaper fastener-tab stock, and diaper fastening  
10 tabs formed from such stock, in a manner compatible with  
11 current diaper manufacturing practice, providing improved  
12 diaper tabs, and improved tabbed diapers, at little or no  
13 increase in costs over the practices of the prior art.

14 In this respect, the present invention provides diaper  
15 tab fasteners having fingerlifts (i.e., end tabs for the tab  
16 fasteners themselves) which are "built-in," which are easy and  
17 convenient to use, which overcome the problems of the prior-  
18 art diaper tab fingerlifts listed above, and which offer new  
19 advantages including the ability to economically provide  
20 improved distinguishability of the fingerlifts from the  
21 remainder of the tabs, the ability to provide for the  
22 absorption of finger oils or other contaminants, and the  
23 ability to add fragrances to the tabs.

24 In respect of the manufacture of diaper fastener-tab  
25 stock with "built-in" end tabs, the invention provides a  
26 variant or alternative to the design of diaper fastener-tab  
27 with built-in end tab taught in U.S Patent Application Serial  
28 No. 07/710,692, filed June 5, 1991, of common assignee.

29 Detailed Description

30 The features and advantages of the invention will be  
31 more fully understood from the following description of  
32 specific examples, together with the drawings, in which:

33 FIG. 1 is a schematic isometric view illustrating certain  
34 prior art coating and slitting practices.

1        FIGS. 2 and 3 are similar views illustrating coating and  
2        slitting practices according to the present invention.

3        FIG. 4 is a broken cross-sectional view taken along plane  
4        4-4 in FIG. 2, and inverted 180 degrees.

5        FIG. 5 is a cross-sectional view of an individual tape  
6        slit from the stock of FIG. 4.

7        FIG. 6 is a cross-sectional view of two layers of a roll  
8        of the tape seen in FIG. 5.

9        FIG. 7 is a cross-sectional view similar to FIG 5 and  
10       showing tape stock for the manufacture of diaper tabs  
11       according to the invention.

12       FIG. 8 is a view similar to FIG. 7 and showing additional  
13       tape stock used with the stock of FIG. 7.

14       FIG. 9 is a cross-sectional view of the tape stocks of  
15       FIGS. 7 and 8 combined with each other. FIG. 9 may also be  
16       interpreted as a side elevation view of an individual diaper  
17       tab cut from the combined stock.

18       FIG. 10 shows an individual tab corresponding to the  
19       construction of FIG. 9 applied around the edge of a diaper.

20       FIG. 11 shows the same tab deployed for fastening to  
21       another part of the diaper.

22       FIG. 12 is a view similar to FIG. 9 and showing a  
23       different form of diaper tab embodying the invention.

24       The coating and slitting shown highly schematically in  
25       FIG. 1 illustrates prior practices in the manufacture of  
26       transfer tape. A roll 10 may comprise a web of release liner  
27       substrate 12 which is coated on both sides with release  
28       coatings (not shown) either in prior coating operations before  
29       the forming of roll 10 or as initial coating and drying steps  
30       (not shown) following off-feed from roll 10.

31       At an adhesive-applying station A, a patterned adhesive  
32       coating 14 is applied to the substrate 12. The patterning  
33       results in a well-known manner from the use of die deckeling  
34       or the use of pattern bars (not shown) to prevent or minimize  
35       the application of adhesive along lines or zones 16 which are  
36       free or relatively free of adhesive.



1       The stock with its patterned adhesive coating is then  
2 slit by the slitters 18 into individual transfer tapes, and  
3 self-wound to form rolls of specific widths, such as the three  
4 individual rolls 21-23 in the illustration. The slitting  
5 occurs along the absolutely or relatively adhesive-free lines  
6 or zones 16. Slitting may also be performed at the adhesive-  
7 free side edges if edge trimming is required, but slitting at  
8 only the central locations is shown to simplify the  
9 illustration.

10       In accordance with well-known practice, the release  
11 coating (not shown) on the adhesive-carrying side of the  
12 substrate 12 is chosen to give a higher or harder release  
13 than the release coating (not shown) on the opposite or  
14 exposed side of the substrate. When each tape is self-wound  
15 into roll form, the adhesive associated with one turn of  
16 substrate contacts the exposed side of the preceding turn of  
17 substrate which bears the release coating which allows  
18 relative low or easy release. The result is that when the  
19 roll is subsequently unwound, the adhesive layer remains  
20 associated with the same length of substrate on which it was  
21 coated even though there is a release coating (the one of  
22 relatively higher or harder release) between the adhesive and  
23 that same length of substrate.

24       The adhesive face of the tape then can be applied to  
25 label facestock or to another object intended to be adhesively  
26 mounted in its end use, and the adhesive 14 permanently  
27 adheres thereto. The substrate 12 then functions as a release  
28 liner protecting the adhesive 14 until the liner is removed  
29 and the label or other object is adhered to its final  
30 mounting. This final removal of the liner utilizes the  
31 relatively higher or more difficult release action of the  
32 release coating on the adhesive-bearing side of the substrate  
33 12.

34       The prior-art procedures described above and illustrated  
35 in FIG. 1 in highly schematic form require that the adhesive  
36 coating be patterned as it is applied in accordance with the

1 specific tape width or widths desired. This means that  
2 adhesive-coated transfer tape stock cannot be premanufactured  
3 and inventoried, to be slit to various widths on demand.  
4 Instead, all widths expected to be eventually sold must be  
5 patterned at the time the adhesive is applied, and widths of  
6 various sizes then held in inventory pending eventual sale.  
7 Such inventory consists of tape stock that has at least been  
8 patterned to width. Slitting to width may be performed in the  
9 same pass as patterning, or may be delayed up until time of  
10 sale. Some widths may sell more slowly than expected, and  
11 others faster, presenting the necessity of maintaining  
12 whatever inventory is "thrust on" the manufacturer by reason  
13 of bad guesses as to demand for various widths. For example,  
14 in the example illustrated in FIG. 1, the operation  
15 illustrated may be carried out as a result of an order for  
16 tape of the width of roll 21, an intermediate width.

17 Relatively narrow tape roll 22 and relatively wide tape  
18 roll 23 (or the patternings for such rolls when slitting is  
19 performed at a later pass) result as byproducts, so to speak,  
20 of the manufacture of tape roll 21 and are a product of the  
21 manufacturer's best guess as to the market for tapes of  
22 various sizes, and must be inventoried until tapes of those  
23 specific sizes are in fact ordered.

24 Another disadvantage of prior art practice is the fact  
25 that it is rather complicated to reset a coating operation  
26 as required by changes in tape widths to be cut. Each change  
27 requires redeckeling a die or resetting a pattern bar.

28 The relatively or absolutely adhesive-free lines or zones  
29 16 present another problem in that the thickness of the stock  
30 is considerably less at these zones than on the portions of  
31 the stock bearing the adhesive layer 12. Thus, the stock at  
32 the edges of the rolls 21-23 is substantially thinner than at  
33 the central portions of the rolls, so that the stock is firmly  
34 wound on itself, layer-to-layer, only at the central portions  
35 and not at the edges. The stock at the edge portions is  
36 therefore subject to being readily deformed and damaged by

1 accidental contact with any solid object.

2 In one aspect of the invention, these complications,  
3 constraints and disadvantages of prior-art practice may be  
4 largely or wholly eliminated. Thus, in the manufacture of  
5 transfer tape as illustrated in FIG. 2, a roll 30 may again  
6 be provided comprising a web of release liner substrate 32  
7 which again is coated on both sides with release coatings  
8 (not shown in this view) either in prior coating operations  
9 before the forming of roll 30 or as initial coating and drying  
10 steps (not shown) following off-feed from roll 30.

11 However, at the adhesive-applying station A, a layer of  
12 adhesive 34 is applied to the substrate 32 continually across  
13 the width of the substrate 32. The adhesive-coating step may  
14 be performed in the absence of any patterning, as shown, or  
15 less preferably there may be patterning at the side edges.

16 Following application of the adhesive layer 34, adhesive-  
17 inhibiting masking 36 is applied at a printing station P. The  
18 masking may be an ink applied with a flexographic printing  
19 press or laser printer (not shown), whose positions across the  
20 width of the adhesive coating 34 may be readily adjusted as  
21 desired to thereby determine tape width. Preferably, the  
22 masking is applied at the side edges, as shown, as well as at  
23 an intermediate portion or portions of the web.

24 Following drying of the ink or masking, employing drying  
25 means if required (not shown), the adhesive-coated stock is  
26 then slit by the slitter 38. Slitting may also be performed  
27 at the side edges if edge trimming is required, but slitting  
28 at only the central location is shown to simplify the  
29 illustration. The slit stock is then self-wound to form the  
30 individual transfer tape roll 41, and the reserve roll 44 of  
31 adhesive-coated stock. The stock in the reserve roll 44 is  
32 not "committed" to specific roll widths, such as the  
33 relatively narrow width of the roll 22 or to the relatively  
34 wide width of the roll 23 as in the prior-art example of FIG.  
35 1.

36 If, at a later time, an order is received for one of the

1   latter widths, or any other width less than that of the  
2   reserve roll 44, the reserve roll can be processed as  
3   illustrated in FIG. 3. Thus, the adhesive-coated reserve  
4   roll 44 is unwound and passed through a printing station P  
5   to receive the adhesive-inhibiting masking 36a. The lateral  
6   location of the print cylinders or jets (not shown) is readily  
7   adjusted to produce the masking at the desired location across  
8   the width of the reserve roll 44, as opposed to the laborious  
9   process of redeckeling a die or readjusting a pattern bar,  
10   either of which involves resetting the coating operation.

11       Following drying of the masking, employing drying means  
12   if required (not shown), the stock is then slit by the slitter  
13   38a. Thus a roll 42 of narrow width is produced pursuant to  
14   a specific order, and also a roll 43 which, if not sold, may  
15   be inventoried for possible later sale at that width, or at  
16   narrower widths after further slitting.

17       FIGS. 4 to 6 illustrate the novel tape stock and tape  
18   of the invention in greater detail. FIG. 4 is a cross-  
19   sectional view, partly broken, taken on plane 4-4 of FIG. 2  
20   and inverted 180 degrees. The easier or lower release coating  
21   33 and higher or harder release coating 35 are shown. FIG.  
22   5 is a cross section of the slit individual tape which is  
23   self-wound into the roll 41. FIG. 6 shows two adjacent wraps  
24   or turns of the roll 42. While these figures are not to  
25   scale, they do give a rough idea of the insignificant effect  
26   of the printed adhesive-inhibiting masking 36 on the overall  
27   thickness of the tape. As suggested in FIGS. 4-6, the tapes  
28   are substantially uniform in thickness from edge to edge.  
29   Actual typical thicknesses which have been used are, for  
30   example, (microns): substrate 120, adhesive layer 30, release  
31   coats (each) 1, ink or masking 0.4.

32       As particularly suggested by FIG. 6, the edge portions  
33   of the tape rolls are substantially as tightly wound as the  
34   center portions, with firm layer-to-layer support between the  
35   various turns of the roll out to the very edges of the roll.

36       Converters of tapes and other products using the printed

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1 adhesive masking of the present invention can handle the  
2 adhesive tapes or stocks efficiently. The rolls can be  
3 tightly wound. There is little or no cutting differential  
4 between masked and unmasked adhesive areas. The rolls unwind  
5 in a uniform manner. The risk of edge damage (nicking) of the  
6 rolls is reduced.

7 As described above, in the foregoing examples of the  
8 invention, the printing of the adhesive barrier is along a  
9 continuous zone or line, and the tape is formed in whole or  
10 in part by slitting along that continuous line through the  
11 tape substrate, an adhesive coating, and the printed barrier.

12 Various adhesives have been used in transfer coating in  
13 the past as illustrated in FIG. 1, and in general any such  
14 adhesive can be adapted to the invention. For example, the  
15 adhesive may be a thermally cross-linked acrylic adhesive, the  
16 cross-linking mechanism comprising a metal chelate such as  
17 aluminum acetylacetonate (in a small weight percentage, say  
18 0.15%).

19 A suitable masking for such adhesive may be formed by  
20 printing, using as the ink "Flexo Write on White" CLA 40457F  
21 supplied by Sun Chemical Corp. The ink may be thinned with  
22 a press solvent to a running viscosity of 20-22 seconds as  
23 measured using a No. 2 Zahn Cup. The solvent may be a mixture  
24 of 75% normal propyl alcohol, 25% ethyl acetate and 5%  
25 "Ektosolve" (Chemcentral).

26 The following has been used for the lower or easier  
27 release coating 33, in weight percentages:

28	Dow Syloff 7044	96.10%
29	Dow Q2-7048	3.90%

30 This coating was applied at 1.5 grams per square meter.

31 The following has been used for the higher or harder  
32 release coating 35:

33	Dow Syloff 7044	51.00%
34	Dow Q2-7069	44.50%
35	Dow Q2-7048	4.50%

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1        This coating was applied at 1.4 grams per square meter.  
2        A suitable choice for liner in the practice of the  
3 invention as above described is 80# "Super Tough" (Otis  
4 Paper).

5        Similar practices may be utilized in the manufacture of  
6 improved diaper fastener-tab stock adapted to be supplied to  
7 a diaper manufacturer and to be separated by the manufacturer  
8 into individual diaper-fastening tabs and applied to  
9 individual diapers, usually two tabs to a diaper for infants,  
10 and two to six for adults.

11       The individual fastener 50 seen in FIG. 9 is, in effect,  
12 a cross-sectional view of the diaper fastener stock from which  
13 the individual fastener has been formed by transverse cuts.  
14 This stock, then, consists of initially flat but flexible  
15 first and second substrates 52 and 54 suitable to be formed  
16 in long passes along the machine direction (into the paper as  
17 viewed in FIGS. 7-9) of a coating and laminating line without  
18 the necessity for folding operations and completely by web  
19 coating, slitting and web-to-web laminating operations, and  
20 suitable for high-speed dispensing on automatic equipment.  
21 The substrates may be polypropylene film 4.6 mils in  
22 thickness, for example.

23       The first or anchoring substrate 52 bears first substrate  
24 adhesive 56 on its underside. The first substrate 52 and the  
25 first substrate adhesive 56 extend, transversely to machine  
26 direction, along first and second length portions 61 and 62  
27 of the web construction, respectively.

28       The second or additional substrate 54 bears second  
29 substrate adhesive 58 on its underside and also extends along  
30 the first and second length portions 61 and 62. Release means  
31 for the adhesive 58 of the second substrate 54 is carried on  
32 the first substrate 52 and may be a release coat 64. This  
33 release means extends along the second length portion 62 but  
34 not significantly along the first length portion.

35       The first and second substrate adhesives may have the  
36 following formulation:

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1	Kraton 1107 (Shell Chemical)	31.7%
2	Escorez 1310LC (Exxon Chemical)	46.3%
3	Wingtack 10 (Goodyear Chemical)	19.8%
4	EthanoX 330 (Ethyl Corp.)	1.0%
5	Plastonox LTDP (American Cyanimid)	1.2%

6           A suitable masking or barrier may be formed by printing,  
7 using as the ink "Suntex 182 Pink" CLA 40457F supplied by Sun  
8 Chemical Corp. The ink may be thinned with the same press  
9 solvent given previously, to the same running viscosity.

10           The second substrate construction as seen in FIG. 7 is  
11 formed in a manner similar to the formation of the tape seen  
12 in FIG. 5. The substrate 54 is formed from a substrate twice  
13 as wide by slitting after being coated with the adhesive 58  
14 and after adhesive barrier means 57 is printed on the adhesive  
15 along a continuous zone or line at the midline of the original  
16 or unslit substrate.

17           Preferably, the barrier means 57 is an ink or other  
18 barrier of a color which contrasts with the color of the  
19 adhesive. (If desired, the substrate 54 may be provided at  
20 its corresponding edge with corresponding coloring, not shown,  
21 which contrasts with the remainder of the substrate. This can  
22 be done by known printing or coextrusion techniques. Slitting  
23 produces two tapes, mirror images of each other, one of which  
24 is the tape seen in FIG. 7, which includes the adhesive  
25 masking portion 57.

26           The first substrate portion as seen in FIG. 8 is formed  
27 by conventional coating techniques and may also represent a  
28 half-width of original substrate stock slit down the middle.  
29 The tapes as seen in FIGS. 7 and 8 can be cut from original  
30 or unslit substrates which are combined prior to slitting, or  
31 can be combined following slitting of the original or unslit  
32 substrates. In any event, when the constructions of FIGS. 7  
33 and 8 are laminated together to form the diaper fastener stock  
34 illustrated in FIG. 9, the masking portion 57 is contained  
35 snugly within the associated end of the lamination to provide  
36 built-in end tab means.

1        Suitable release means may be provided to allow the  
2        construction as so far described to be self-wound for storage  
3        and shipment. Such release means may be a release coat 66 on  
4        the second substrate 54. When the diaper fastener stock is  
5        wound on itself, the first substrate adhesive 56 is releasably  
6        supported against the release coat 66, and readily separates  
7        therefrom when the roll is subsequently unwound on a diaper  
8        manufacturing line.

9        When the diaper fastener stock is wound as just  
10       described, the built-in end tab afforded by the masking  
11       portion 57 and associated overlying portion of substrate 54  
12       allows the roll to form evenly without build-up of one side,  
13       and presents evenly thick edges which are supported from one  
14       turn to the next in the wound roll.

15       On the manufacturing line, the diaper fastener stock is  
16       unwound and cut transversely to form a series of individual  
17       fasteners which are applied, usually in pairs, to individual  
18       diapers by being folded around a diaper edge. FIG. 10 shows  
19       an individual fastener cut from the stock described above  
20       applied around the edge of a diaper 70. This is the  
21       undeployed condition of the diaper fastener. Fasteners made  
22       according to the invention have been found to perform  
23       satisfactorily when applied to Huggies Super Trim diapers  
24       (Kimberly Clark) which, as is typical of many contemporary  
25       disposable diaper constructions, have a fastener-receiving  
26       frontal tape to reinforce the relatively fragile and easily  
27       torn diaper outer plastic shell or envelope.

28       FIG. 11 illustrates the deployed condition of the diaper  
29       fastener. When a diaper is applied to an infant or other  
30       person, each diaper fastener is moved from undeployed to  
31       deployed condition. The second length portion of the second  
32       substrate 54 constitutes deployment means separable from the  
33       second length portion of the first or anchoring substrate 52  
34       for deployment as shown in FIG. 11 and adherence to another  
35       portion of the diaper (not shown) by application of the  
36       exposed second length portion of the second substrate adhesive



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1 58 to such other diaper portion. The end-tab means comprising  
2 masking portion 57 is at the free end of such deployment  
3 means.

4 In other words, the second substrate 54 will be seen to  
5 constitute substrate means which has an inner and an outer  
6 end, and which is fastened at its inner end to one part of the  
7 diaper via the adhesive layers 56 and 58 and the substrate 52  
8 (FIG. 10). The tape will be seen to have a pressure-sensitive  
9 adhesive face 59 (FIG. 11) at least at the outer end of such  
10 substrate means, such face being carried on release means 64  
11 which in turn is carried on the same part of the diaper via  
12 the substrate 52 and adhesive 56 (FIG. 10). The second  
13 substrate is adapted to have its outer end peeled from and  
14 thereby deployed from the part of the diaper seen in FIGS. 10  
15 and 11 for fastening to another part of the diaper (not shown)  
16 to thereby establish a user joint and fasten the diaper. The  
17 outer end of the second substrate has lift tab means in the  
18 form of the masking portion 57 for initiating peeling of the  
19 outer end from the release means 64.

20 The barrier means or masking portion may, if desired,  
21 be provided with fragrances, which may simply be added to a  
22 printing ink. Absorbent powders in the ink may function to  
23 pick off finger oils of the parent or other caregiver who  
24 handles the diaper tab, thereby reducing the likelihood of  
25 contamination of the bonding interface established when the  
26 tab is fastened. The ingredients of the barrier or masking  
27 may have a double function, for example an absorbent powder  
28 may contribute both to deactivating or masking the pressure-  
29 sensitive adhesive and to absorbing finger oils.

30 Many variations in the specific example described above  
31 are possible. FIG. 12 shows a variant in which the invention  
32 is incorporated in a diaper fastener of the general type shown  
33 in U.S. Patent 4,020,842 to Richman et al. the disclosure of  
34 which is adapted by reference as if fully repeated herein.  
35 This type of fastener has more than one additional substrate  
36 and correspondingly more than one deployment means. In the

1 construction of FIG. 12, a first or anchoring substrate 52 and  
2 a second or additional substrate 54, and associated first and  
3 second substrate adhesives 56 and 58, are provided similarly  
4 to the construction of FIG. 9. Further, a third substrate 74  
5 (constituting a second additional substrate) is provided along  
6 with associated third substrate adhesive 76. Since this  
7 substrate is the outermost in this construction, a release  
8 means such as the release coat 77 is provided along the entire  
9 length of the substrate for self-winding purposes. The  
10 release coat 66 of the FIG. 9 construction is replaced by  
11 shortened release coat 66a which extends along the second  
12 length portion corresponding to length portion 62 in FIG. 9,  
13 but not significantly along the first length portion  
14 corresponding to length portion 61 in FIG. 9. Preferably, the  
15 substrate adhesives 58 and 76 are interrupted at the fold-  
16 around portion of the diaper fastener by adhesive gaps 58g and  
17 76g.

18 The second substrate 54 of the FIG. 12 construction is  
19 interrupted by a slit or small gap 72. The general operation  
20 of the construction in the manner of deployment, reopening and  
21 reclosing is the same as that of the aforesaid Richman et al.  
22 patent. However end-tab means of the general kind intended  
23 by the present invention is provided on at least one of the  
24 deploying substrates. In this case, end-tab means comprising  
25 the printed masking portion 57a is provided in association  
26 with the free end of substrate 54, and end-tab means  
27 comprising the printed masking portion 57b is provided in  
28 association with the free end of substrate 74.

29 Still other forms of diaper fasteners utilizing the  
30 invention may be provided. Thus a type of two-substrate tab  
31 may be provided wherein both substrates perform an anchoring  
32 function, and less substrate material is used than in the  
33 designs previously described.

34 Such diaper tab stock may be first combined on the diaper  
35 manufacturing line from stock components made by different  
36 manufacturers. For example the two substrates and associated

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1 adhesives and release coats may be provided in self-wound form  
2 from different sources or from a single source.

3 Thus as shown in FIGS. 13-17, first and second substrates  
4 82 and 84 are provided with first and second substrate  
5 adhesives 86 and 88, and release coats 94 and 96 are provided  
6 on the first and second substrates. In the industry, the  
7 first and second substrates together with associated adhesives  
8 and coatings are often referred to respectively as release  
9 tape stock and fastener tape stock. The diaper manufacturer  
10 combines the release tape stock or substrate 82 and the  
11 fastening tape stock or substrate 84 in the manner shown in  
12 FIG. 15, then cuts the combined tape stock into individual  
13 fastener tapes and applies successive fasteners around a  
14 diaper edge in the manner seen in FIG. 16. Fastener tapes for  
15 the opposite side edge of the diaper are formed and combined  
16 in the mirror image of the illustrated tape.

17 The second substrate 84 will be seen to constitute  
18 substrate means which has an inner and an outer end, and which  
19 is directly fastened at its inner end to one part of the  
20 diaper by the adhesive layer 88. (FIG. 16). The tape will be  
21 seen to have a pressure-sensitive adhesive face 89 (FIG. 17)  
22 at least at the outer end of such substrate means, such face  
23 being carried on release means 94 which in turn is carried on  
24 the same part of the diaper via the substrate 82 and adhesive  
25 86 (FIG. 16). The second substrate is adapted to have its  
26 outer end peeled from and thereby deployed from the part of  
27 the diaper seen in FIGS. 16 and 17 for fastening to another  
28 part of the diaper (not shown) to thereby establish a user  
29 joint and fasten the diaper. The outer end of the second  
30 substrate has lift tab means in the form of the masking  
31 portion or barrier means 87 for initiating peeling of the  
32 outer end from the release means 94.

33 In this construction, the release coat 94 serves two  
34 release functions; it allows self-winding of the substrate  
35 82 for shipment from the tape stock manufacturer to the diaper  
36 manufacturer and it serves as the release face against which

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1 the adhesive face 89 is stored in the conditions shown in  
2 FIGS. 15 and 16. The release coat 96 performs the single  
3 release function; it allows self-winding of the substrate 84  
4 for shipment.

5 The various slitting, patterning and combining operations  
6 at the fingerlift end of the diaper fastener stock can be  
7 performed in duplicate at the web center on a stock  
8 manufacturing line, with the slitting, patterning and  
9 combining on one lateral side of the infed webs being done  
10 in mirror image to the same operations on the other side.  
11 In such case, of course, the width of the infed webs is at  
12 least double the width of the resulting diaper fastener stock.

13 It is to be noted that in all instances the end-tab means  
14 is located within the length of the longest of the one or more  
15 additional or deployment substrates.

16 The result is a diaper tab fastener with a fingerlift  
17 superior to those of the prior art discussed above. The end-  
18 tab means of the invention can be readily and conveniently  
19 grasped and manipulated by the person applying the diaper.  
20 The end-tab means can be readily fabricated on a diaper  
21 fastener stock production line by simple patterning and  
22 slitting steps that are fully compatible with economical high  
23 speed production. The stock can be self-rolled in smooth,  
24 uniform rolls that are free of local high spots and resulting  
25 distortions.

26 The invention is not limited to the specific details of  
27 the disclosed embodiments, but is defined in the following  
28 claims.

## WHAT IS CLAIMED IS:

1. A method of forming a slit-to-order relatively narrow pressure-sensitive adhesive tape or tapes from an inventory including a relatively wide roll of pressure-sensitive adhesive tape stock comprising a substrate coated with a layer of pressure-sensitive adhesive, the method comprising the steps of unwinding the relatively wide roll of pressure-sensitive adhesive tape stock, combining adhesive-inhibiting masking with the adhesive of said unwound stock along a continuous machine-direction line or lines at an intermediate point or points across the width of the unwound stock, and slitting said substrate, adhesive layer and masking along said line or lines to form at least one slit tape narrower in width than said roll of tape stock.

2. A method of manufacturing self-wound pressure-sensitive-adhesive transfer tapes comprising combining release means with the first and second faces of a substrate with the second face having the easier release, combining a layer of pressure-sensitive adhesive with the first face of said substrate, combining adhesive-inhibiting masking with said adhesive along a continuous machine-direction line or lines, and slitting said substrate, adhesive layer and masking along said line or lines to form at least one slit tape having an edge thickness substantially equal to the average thickness of the tape across its width.

3. A method as in the preceding claim in which at least two slit tapes are formed in said slitting step, and including the steps of winding the slit tapes into slit rolls, and subsequently unwinding at least one of said slit rolls, combining additional adhesive-inhibiting masking with the adhesive of said slit roll along a continuous machine-direction line or lines at an intermediate point or points across the width of the slit roll, and slitting said

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9 substrate, adhesive layer and masking along said line or lines  
10 to form at least one additional slit tape narrower than the  
11 tape forming said slit roll.

1 4. A method of manufacturing pressure-sensitive tape  
2 comprising the steps of feeding a substrate along a  
3 manufacturing line, combining a layer of pressure-sensitive  
4 adhesive with a first face of said substrate, printing said  
5 layer of pressure-sensitive adhesive with a patterned  
6 adhesive-inhibiting masking to define a masking pattern  
7 comprising at least one continuous line, slitting said  
8 substrate, adhesive layer and masking along said at least one  
9 continuous line defined by said pattern coating to form a slit  
10 tape having an edge thickness substantially equal to the  
11 average thickness of the tape across its width, and further  
12 processing said slit tape by releasably combining the side of  
13 said pressure-sensitive adhesive layer bearing said masking  
14 against a second substrate face, said second substrate face  
15 comprising the other face of said first-named substrate to  
16 thereby produce a self-wound tape, or comprising the face of  
17 an additional substrate to thereby produce a multisubstrate  
18 tape.

1 5. A method as in the preceding claim in which said  
2 combining of said pressure-sensitive layer against said second  
3 substrate face is preceded by the coating of at least parts  
4 of said second substrate face with a release coating.

1 6. In a diaper having adhesive fastener tapes, each  
2 fastener tape having substrate means having an inner and an  
3 outer end and being fastened at its inner end to one part of  
4 the diaper, each tape having a pressure-sensitive adhesive  
5 face at least at the outer end of said substrate means, said  
6 face being carried on release means which in turn is carried  
7 on said one part of the diaper, said substrate means being  
8 adapted to have its outer end peeled from and thereby deployed

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9 from said one part of the diaper for fastening to another part  
10 of the diaper to thereby establish a user joint and fasten the  
11 diaper, said adhesive face being peelable from said release  
12 means to effect said deployment, the outer end of said  
13 substrate means having lift tab means for initiating said  
14 peeling of said outer end, the improvement comprising  
15 providing said lift tab means in the form of a printed  
16 adhesive-inhibiting masking means on the adhesive face at the  
17 outermost part of said outer end.

1 7. A device as in the preceding claim, said adhesive-  
2 inhibiting masking means being in contact with said release  
3 means.

1 8. A device as in the preceding claim, said adhesive-  
2 inhibiting masking means extending across the width of said  
3 tape.

1 9. A device as in the preceding claim, the end boundary  
2 of said outer end comprising a slit-formed edge intersecting  
3 the extremities of said tape, said adhesive face and said  
4 adhesive-inhibiting masking means.

1 10. In a diaper fastener formed of a web construction  
2 of linerless reclosable diaper fastener stock made up of  
3 initially flat but flexible layers suitable to be formed in  
4 long passes along the machine direction of a coating and  
5 laminating line and to be rolled up for storage and shipment,  
6 and unrolled for use by diaper manufacturers, and fabricatable  
7 completely by web coating, slitting and web-to-web laminating  
8 operations and without the necessity for folding operations  
9 and usable for high speed dispensing on automatic equipment,  
10 including a first substrate bearing first substrate adhesive  
11 on its underside, and extending, transversely to machine  
12 direction, along first and second length portions, and one or  
13 more additional substrates bearing one or more corresponding

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14 substrate adhesives and extending along said first and second  
15 length portions, said fastener being mountable around the edge  
16 of a diaper with said first substrate constituting an  
17 anchoring substrate and said second length portions of said  
18 one or more additional substrates comprising deployment means  
19 separable from said second length portion of said anchoring  
20 substrate for deployment and engagement with another part of  
21 the diaper, and end-tab means associated with the free end of  
22 said deployment means, the improvement wherein said end tab  
23 means associated with at least one of said at least one or  
24 more additional substrates is defined by adhesive-inhibiting  
25 masking means printed on the substrate adhesive associated  
26 with said at least one substrate.

1 11. A construction as in the preceding claim in which  
2 the thickness of said masking means is less than 1 percent  
3 of the combined thickness of the associated substrate and  
4 substrate adhesive, whereby said diaper fastener stock from  
5 which the fastener is formed has a substantially uniform edge-  
6 to-edge thickness, said stock may be tightly rolled, and the  
7 layer edges at both sides of rolls of said stock are solidly  
8 supported by adjacent layer edges.



1/4

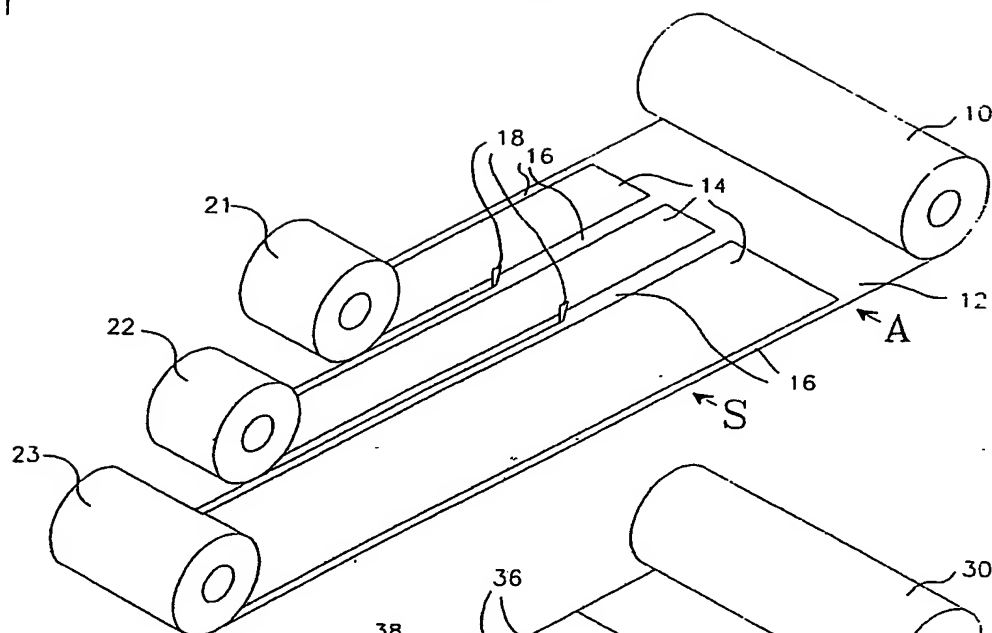


FIG. 1  
(PRIOR ART)

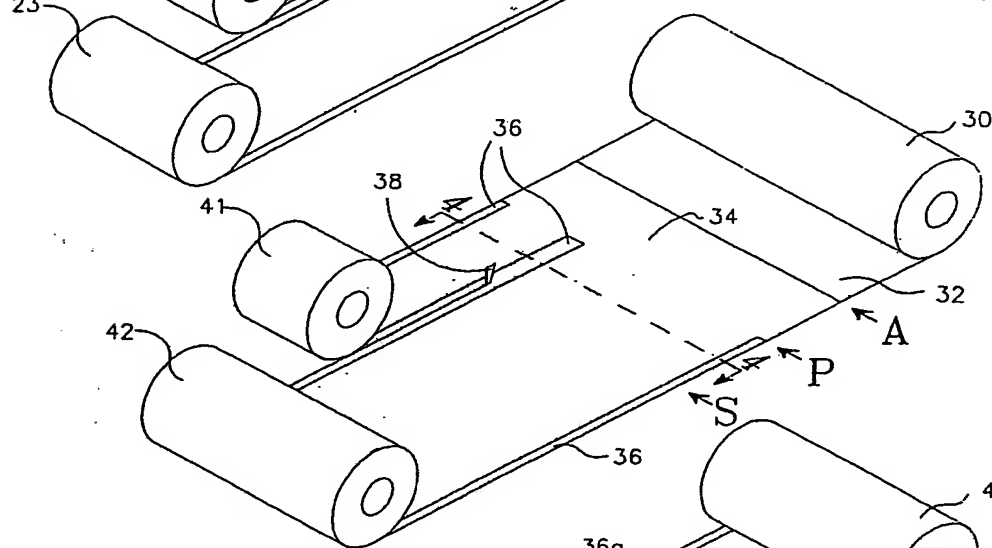


FIG. 2

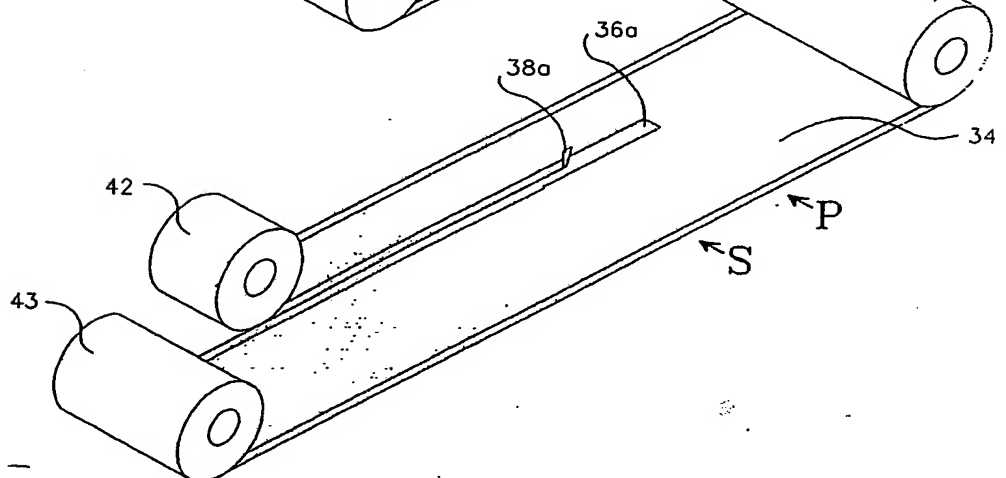


FIG. 3

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2/4

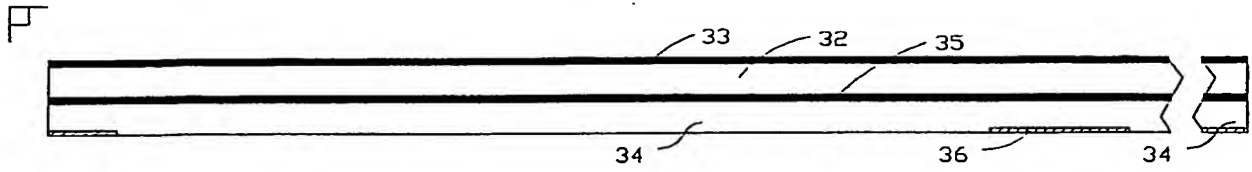


FIG. 4

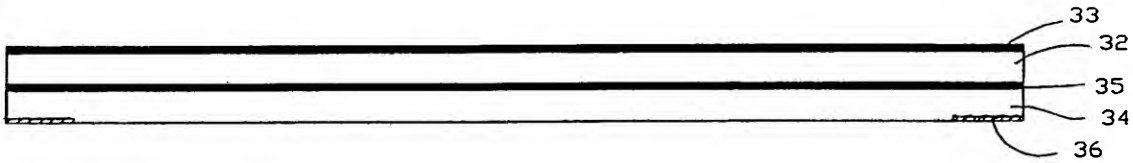


FIG. 5

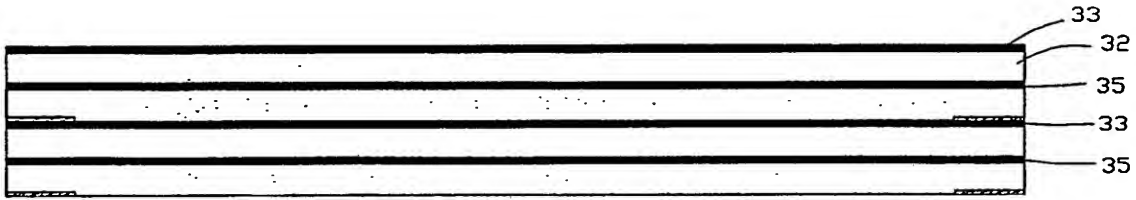


FIG. 6

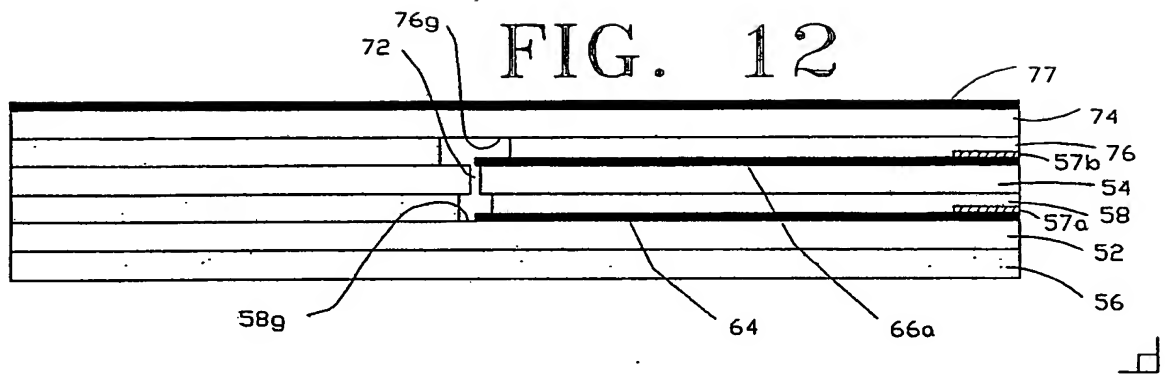
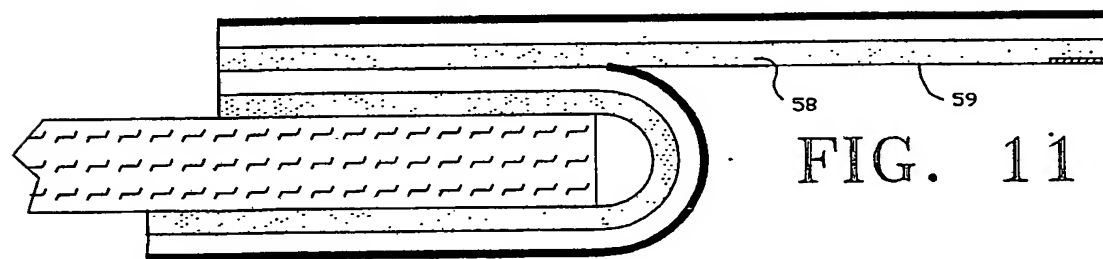
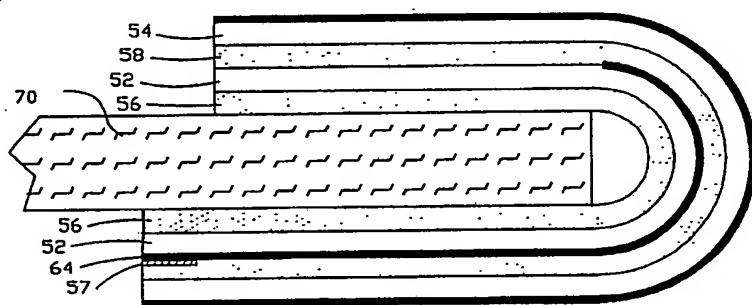
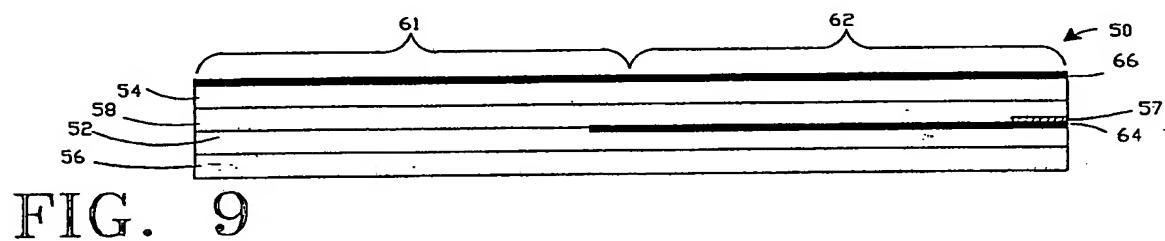
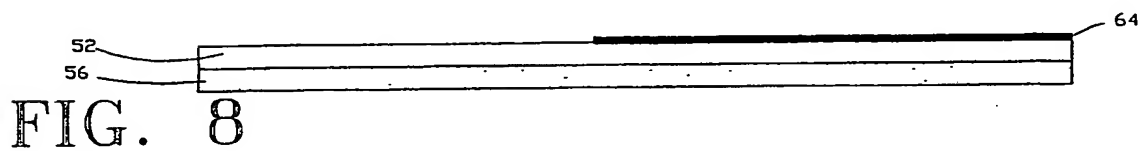
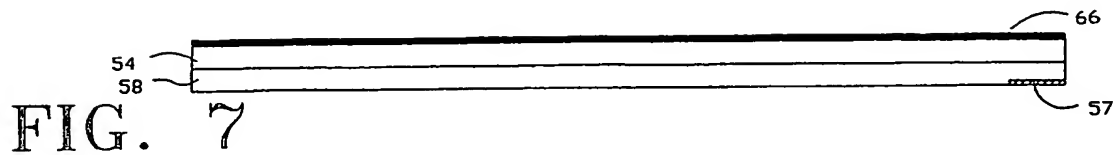


FIG. 12



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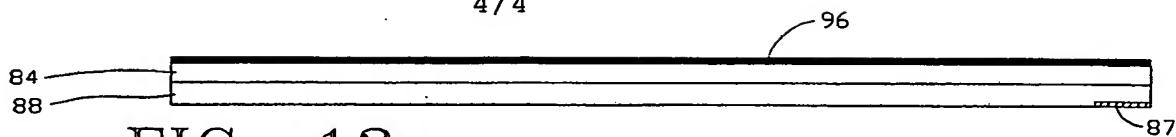


FIG. 13

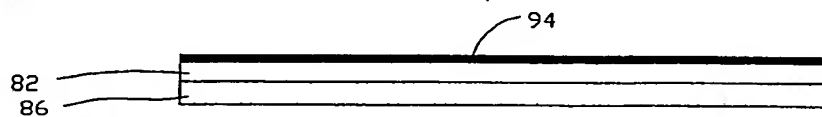


FIG. 14



FIG. 15

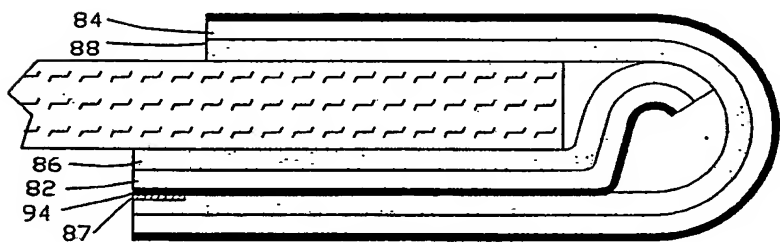


FIG. 16

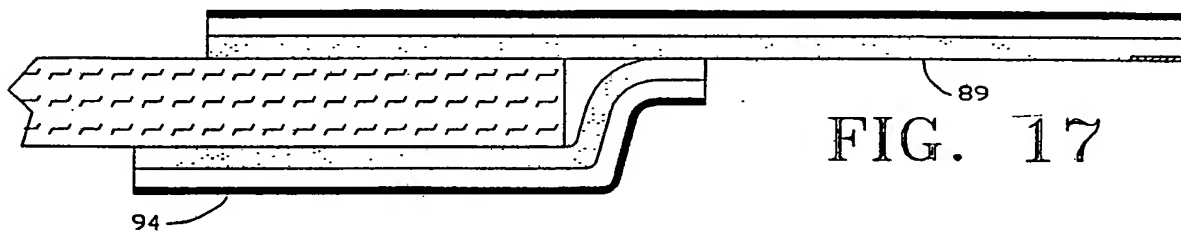


FIG. 17

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US93/03565

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) : A61F 13/15, B32B 7/12, 15/04

US CL : 604/390,428/352

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/389,602/54-57,900,903,428/354,40-42,427/1259;402

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A, 3,874,893 (Cherrin) 01 April 1975, See col. 1, lines 46-48 and col. 5, lines 23-26.	1-11
Y	US,A, 4,068,028 (Samonides) 10 January 1978, see col. 4, lines 39-40.	1-5
Y	US,A, 4,107,811 (Imsande) 22 August 1978, see col. 7, lines 40-64 on col. 2, lines 16-23, and 40-45.	6-11
Y	US,A, 4,801,480 (Panza et al.) 31 January 1989, see figure 3.	6-11
Y	US,A, 4,299,223 (Cronkrite) 10 November 1981, see figures 1-2 and 6-7.	6-11



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	*T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be part of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

21 JUNE 1993

Date of mailing of the international search report

29 JUL 1993

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